## **RUSH LAKE**



### Introduction

Rush Lake is a natural impoundment of a southern tributary to the Great Salt Lake. The lake is at the northern

end of Rush Valley near Stockton, where the formation of a sandbar on Lake Bonneville has blocked drainage further north. Rush Lake is several miles south of Tooele.

Lake elevation (meters / feet)	1,524 / 5,000
Surface area (hectares / acres)	32.4 / 80
Watershed area (hectares / acres)	689 / 1,701
Volume (m3 / acre-feet)	
capacity	300,000 / 243
conservation pool	0
Annual inflow (m <sup>3</sup> / acre-feet)	
Retention time (years)	
Drawdown (m <sup>3</sup> / acre-feet)	
Depth (meters / feet)	
maximum	1.7 / 5.6
mean	0.9 / 3
Length (meters / feet)	595 / 1,953
Width (meters / feet)	119 / 390
Shoreline (meters / feet)	1,358 / 4,453

It is also known as Rush ReservoTihe lake area is about 50% BLM owned and 50% privately owned. Public access is unrestricted. Water is not taken from the lake for human use, but the lake is used for windsurfing, other summer recreation and commercial fish production on occasion.

Rush Lake was created when shore currents on Lake Bonneville deposited a spit, which extended across the gap between the Oquirrh Mountains and South Mountain, eventually sealing off the Rush Valley portion of Lake Bonneville from the main body of the lake. Decreasing

### Location

 $\begin{array}{c|cccc} County & Tooele \\ Longitude / Latitude & 112 23 00 / 40 26 40 \\ USGS Maps & South Mountain, UT 1980 \\ DeLorme's Utah Atlas & Gazetteer^{TM} & Page 52 C-3 \\ Cataloging Unit & Tooele/Rush Valleys (16020304) \\ \end{array}$ 

precipitation ended the glacial epoch, and Lake Bonneville evaporated down to its present elevation (the Great Salt Lake). Rush Valley, which drained directly into the Great

# LAKE REPORTS

Salt Lake in preglacial times, was impounded by the

# File Contains Data for PostScript Printers Only

developed sandbar. Because of the extremely low precipitation (less than 10 inches per year in the valley) and high evapo-transpiration rates, Rush Valley does not produce enough runoff to fill the impoundment and cut a gap in it. In wet years, however, enough runoff occurs to back water up behind the impoundment, creating Rush Lake. Just prior to the 83-84 floods, Rush Lake was not a lake, but a wetland. The floods inundated an area of approximately five square miles forming the lake. Since then the lake has generally been decreasing in size except during periods of high precipitation. Currently the lake fairly shallow and much smaller in size. Undrained lakes in the Great Basin usually become extremely saline. This is happening to Rush Lake as it decreases in volume. The increased salinity and other factors have impacted the fishery causing fishkills at times. The lake will continue to evaporate at about 2 feet per year, and unless another wet year happens before the end of the decade, Rush Lake will probably shrink back into a wetland.

### Recreation

Rush Lake is accessible from U-36 from the town of Stockton (5 miles south of Tooele and 5 miles north of the U-73 jct). From downtown Stockton, go west on an improved gravel road towards a small mountain (South Mountain) This road crosses the sandbar and provides access to various points along Rush Lake.

Fishing and windsurfing are the primary recreational uses of the lake. As lake depth fluctuates throughout the seasons and from year to year, recreational potential also fluctuates. During wet years, the lake has been used for waterskiing.

There are no permanent recreational facilities at the lake. The BLM has had portable latrines on the site for several years. It is possible to launch a boat on the lake during wet years. There are no private campgrounds in the area, but there are USFS campgrounds up South Willow Creek in the Stansbury Mountains. From Rush Lake, follow the gravel road to the west, after five miles it intersects the St. John-Grantsville Road (paved). Go north on this road for about three miles, and South Willow Canyon is to the west (left). The campgrounds are several miles up the canyon on the gravel road.

# **Watershed Description**

Rush Valley is bounded by the Sheeprock Mountains in the south, the Tintic Mountains to the southeast, the Oquirrh Mountains to the east, South Mountain to the north, the Stansbury Mountains to the northwest, and the Onaqui Mountains to the west. This diverse assemblage of mountain ranges produces runoff, but the valley is wide and dry that streams disappear shortly after they enter the valley and do not provide water to Rush Lake by subterranean flow. Any outflow is also subsurface,

through the above-mentioned Lake Bonneville sandbar.

The watershed high point, Lowe Peak, is 3,228 m (10,590 ft) above sea level, thereby developing a complex slope of 11.9% to the reservoir. (Lowe Peak is in relatively close proximity to the lake. Other mountain ranges form much shallower slopes to the lake.) There are no perennial streams flowing into the lake.

Soil associations are unknown, but the watershed is composed of soils formed from a vast array of different geologic formations in the various mountain ranges, in addition to alluvial fans and lake bottom.

The vegetation communities consist of sagebrush-grass and pinyon-juniper. Spruce-fir and alpine vegetation communities are probably found at higher elevations. The watershed receives 25 - 102 cm (10 - 40 inches) of precipitation annually. The frost-free season around the reservoir is 100 -140 days per year.

Land use is mostly native grazing of cattle and sheep. The South Area of the Tooele Army Depot occupies 30 square miles of the watershed. Some other land uses, including cropland, urban, and recreation occupy small areas of the watershed.

### **Limnological Assessment**

The water quality of Rush Lake is marginal. It is considered to be extremely hard with a hardness concentration value of approximately 2,076 mg/L (CaCO3) and a increasing trend exists as evapo-transpiration reduces the volume of the lake. The only parameter that has exceeded State water quality standards for defined beneficial uses is total phosphorus. The average concentrations of total phosphorus in the water column consistently exceeds the recommended pollution indicator for phosphorus of 25 ug/L. The phosphorus concentration in 1991 was 225 ug/L. Current data suggest that the reservoir is a nitrogen limited system. However, due to the shallow nature of the lake, the wind keeps the lake fairly turbid. This restricts the production of algae throughout the water column and alleviates some of the problems that would be associated with consistently large algal blooms. Despite these conditions, TSI values indicate the reservoir is still hypereutrophic. As noted in the August 29, 1991 profile the lake is shallow and does not stratify.

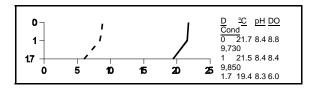
According to DWR fish kills have been reported in recent years due to a decline in water quality as saline conditions have increased. Maintenance of the warm water fishery have become increasingly difficult without sufficient quantities of freshwater feeding the lake to reduce salt concentrations.

The DWR has not stocked Rush Lake since 1988, when it released 71,000 largemouth bass fry in the lake. The lake was over 4 miles long and nearly 20 feet deep

Limnological Data				
Data averaged from STORET site: 596081, 596082.				
Surface Data	<u> 1989</u>	<u>1991</u>		
Trophic Status	Н	Н		
Chlorophyll TSI	56.93	65.25		
Secchi Depth TSI	52.35			
Phosphorous TSI	73.19			
Average TSI	60.83			
Chlorophyll a (ug/L)	14.78			
Transparency (m)	1.7			
Total Phosphorous (ug/L)	121	228		
pН	8.1	8.4		
Total Susp. Solids (mg/L)	94	140		
Total Volatile Solids (mg/L)	-	36		
Total Residual Solids (mg/L)	-	60		
Temperature (°C / °f)	16/61			
Conductivity (umhos.cm)	3980	9165		
Water Column Data				
Ammonia (mg/L)	0.18	0.09		
Nitrate/Nitrite (mg/L)	-	0.01		
Hardness (mg/L)	1634	2519		
Alkalinity (mg/L)	250	264		
Silica (mg/L)	-	17.25		
Total Phosphorous (ug/L)	120	225		
Miscellaneous Data				
Limiting Nutrient	N	N		
DO (Mg/l) at 75% depth	7.1	7.7		
Stratification (m)	NO	NO		
Depth at Deepest Site (m)	3.5	1.7		

after the floods of 83-84, but since then it has consistently decreased in size and depth, while nutrients and chemicals have become more concentrated. Given the natural fluctuations in precipitation, the lake is always in a state of flux. It will become larger only after very wet winters. Fish populations will rise after wet winters, but diminish throughout the year and after average to dry winters.

In 1986, when the lake was still large and water quality was good, fish populations included (in order of abundance) Utah chub (*Gila atraria*), carp (*Cyprinus carpio*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), channel catfish (Ictalurus punctatus), yellow perch (*Perca flavescens*), black crappie (*Pomoxis nigromaculatus*), and black bullhead



(*Ictalurus melas*). The reservoir has never been chemically treated in by the DWR to control rough fish competition, so native fish populations may be present in the lake.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume	% Den	sit	y
	(mm³/liter)	By Vol	um	ne
Centric Diatoms	0.228	31.81		
Pennate Diatoms	0.220	30.69		
Ankistrodesmus falo	catus0.157	21.90		
Merismopedia glaud	ca 0.040	5.58		
Scenedesmus quad	dricauda	0. 0	4	0
5.58				
Oocystis sp.	0.025	3.49		
Chlamydomonas gl	obosa	0. 0	0	7
0.95				
Total	0.717			
Shannon-Weaver In Species Evenness Species Richness [a	0.79			

The phytoplankton community is dominated by the presence of diatoms and green algae.

### **Pollution Assessment**

Nonpoint pollution sources include the following: sedimentation and nutrient loading from grazing; wastes and litter from recreation; nutrients, cleaning chemicals and human wastes from urban areas; sediments, pesticides and other pollutants from agricultural lands; and sediments and chemicals from mines.

There are a large number of inactive miles in the watershed, with unvegetated slag piles and other relics left from prior operation that could contribute pollutants as water leaches through tailings or other areas carrying

Information	
Management Agencies Bureau of Land Management Pony Express Resource Area Wasatch Front Regional Council Division of Wildlife Resources Division of Water Quality Recreation Great Salt Lake Travel Region (SLC) Tooele Chamber of Commerce Springville Fish Hatchery (DWR)	539-4001 977-4300 292-4469 538-4700 538-6146 521-2882 882-0690 489-4567

pollutants into waterways.

There are two active mines, the Ophir Gold Mine in Ophir Canyon in the Oquirrh Mountains, and Roudabush #1, a stone mine on Hickman Creek. These active mines are managed and operated under discharge permits from the UPDES program and will probably not have substantial effects on Rush Lake.

# **Beneficial Use Classification**

The state beneficial use classifications include boating and similar recreation (excluding swimming) (2B) and warm water game fish and organisms in their food chain (3B).